

WHAT IS CLAIMED IS:

1. A porous, biodegradable matrix for the replacement of bone which maintains physical integrity for a period of at least about three days after implant and its porosity for a period of about seven to fourteen days after implant into a physiological environment in which bone replacement is occurring, comprising a bound network of and insoluble biopolymer fibers, binder and immobile calcium phosphate mineral.

10 2. A matrix according to Claim 1 wherein said binder is selected from the group consisting of soluble collagen, gelatin, polylactic acid, polyglycolic acid, copolymers of lactic and glycolic acid, polycaprolactone, carboxymethylcellulose, cellulose esters, dextrose, dextran, 15 chitosan, hyaluronic acid, ficol, chondroitin sulfate, polyvinyl alcohol, polyacrylic acid, polypropylene glycol, polyethylene glycol, water soluble polyacrylates and water soluble polymethacrylates.

20 3. A matrix according to Claim 1 wherein said biopolymer comprises fibrillar collagen.

4. A matrix according to Claim 1 wherein said mineral comprises hydroxyapatite.

25 5. A matrix according to Claim 1 wherein said mineral consists of particles of a diameter of about five microns or less.

6. A matrix according to Claim 1 wherein said mineral is released as particles into said physiological environment during replacement with bone in a time-release

profile which maintains said physical integrity and porosity, respectively for said respective periods of time.

7. A matrix according to claim 3 wherein said collagen and immobilized calcium phosphate are in the form of mineralized collagen containing about 30-80% by weight of collagen.

8. A matrix according to any of Claims 1 through 7 further comprising marrow cells.

9. A matrix according to any of Claims 1 through 7 further comprising autogenous bone.

10. A matrix according to any of Claims 1 through 7 further comprising one or more bone growth factors.

11. A method of making a biodegradable, porous bone grafting matrix, comprising the steps of:

15 (a) forming a dispersion comprising a biodegradable water-insoluble biopolymer, a water-soluble binder, and particulate calcium phosphate mineral immobilized by said binder or biopolymer;

(b) forming said dispersion into a porous matrix;

(c) cross-linking said porous matrix.

12. A method according to Claim 11 wherein said step (b) comprises freezing and lyophilizing said dispersion.

25 13. A method according to Claim 11 wherein said dispersion further comprises leachable particles and said

step (b) comprises drying said dispersion and leaching said particles to form said matrix.

14. A method according to Claim 11 wherein said dispersion further comprises sublimable particles and said  
5 step (b) comprises drying said dispersion and subliming said particles to form said matrix.

15. A method according to Claim 11 wherein said biodegradable water-insoluble biopolymer comprises mineralized collagen fibrils containing about 30-80% by  
10 weight of collagen.

16. A method according to Claim 11 wherein said binder comprises soluble collagen.

17. A method according to Claim 11 wherein said mineral comprises hydroxyapatite.

15 18. A method according to Claim 11 wherein said mineral consists of particles of a diameter of about five microns or less.

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